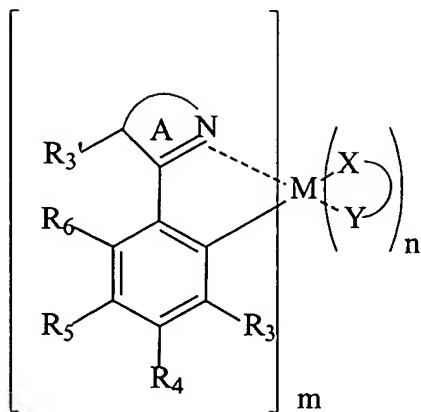


**WHAT IS CLAIMED IS:**

1. A compound having the structure:



wherein

M is a metal having an atomic weight greater than 40;

$R_3'$  is a substituent selected from the group consisting of alkyl, heteroalkyl, aryl, heteroaryl, and aralkyl, wherein  $R_3'$  is optionally substituted by one or more substituents Z;

$R_5$  is a substituent selected from the group consisting of aryl and heteroaryl, wherein said aryl or heteroaryl is unsubstituted or optionally, substituted with one or more non-aromatic groups;

ring A is an aromatic heterocyclic or a fused aromatic heterocyclic ring with at least one nitrogen atom that is coordinated to the metal M, wherein the ring A can be optionally substituted with one or more substituents Z;

$R_3$  is a substituent selected from the group consisting of H, alkyl, alkenyl, alkynyl, alkylaryl, CN,  $CF_3$ ,  $C_nF_{2n+1}$ , trifluorovinyl,  $CO_2R$ ,  $C(O)R$ ,  $NR_2$ ,  $NO_2$ , OR, halo, aryl, heteroaryl, substituted aryl, substituted heteroaryl or a heterocyclic group;

$R_4$  is a substituent selected from the group consisting of H, alkyl, alkenyl, alkynyl, alkylaryl, CN,  $CF_3$ ,  $C_nF_{2n+1}$ , trifluorovinyl,  $CO_2R$ ,  $C(O)R$ ,  $NR_2$ ,  $NO_2$ , OR, halo, aryl, heteroaryl, substituted aryl, substituted heteroaryl or a heterocyclic group;

additionally or alternatively,  $R_3$  and  $R_4$ , together from independently a fused 4 to 7-member cyclic group, wherein said cyclic group is cycloalkyl, cycloheteroalkyl, aryl, or heteroaryl; and wherein said cyclic group is optionally substituted by one or more substituents Z;

$R_6$  is a substituent selected from the group consisting of H, alkyl, alkenyl, alkynyl, alkylaryl, CN,  $CF_3$ ,  $C_nF_{2n+1}$ , trifluorovinyl,  $CO_2R$ ,  $C(O)R$ ,  $NR_2$ ,  $NO_2$ , OR, halo, aryl, heteroaryl, substituted aryl, substituted heteroaryl or a heterocyclic group;

alternatively,  $R_3'$  and  $R_6$  may be bridged by a group selected from  $-CR_2-CR_2-$ ,  $-CR=CR-$ ,  $-CR_2-$ ,  $-O-$ ,  $-NR-$ ,  $-O-CR_2-$ ,  $-NR-CR_2-$ , and  $-N=CR-$ ;

each R is independently H, alkyl, alkenyl, alkynyl, heteroalkyl, aryl, heteroaryl, or aralkyl; wherein R is optionally substituted by one or more substituents Z;

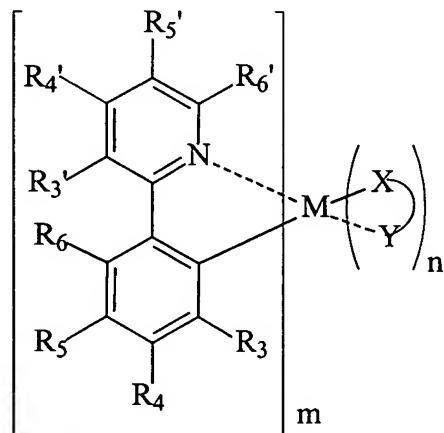
each Z is independently a halogen,  $R'$ ,  $O-R'$ ,  $N(R')_2$ ,  $SR'$ ,  $C(O)R'$ ,  $C(O)OR'$ ,  $C(O)N(R')_2$ , CN,  $NO_2$ ,  $SO_2$ ,  $SOR'$ ,  $SO_2R'$ , or  $SO_3R'$ ;

Each  $R'$  is independently H, alkyl, perhaloalkyl, alkenyl, alkynyl, heteroalkyl, aryl, or heteroaryl;

(X-Y) is an ancillary ligand;

m is a value from 1 to the maximum number of ligands that may be attached to the metal; and  $m + n$  is the maximum number of ligands that may be attached to the metal.

2. The compound of claim 1, having the structure:



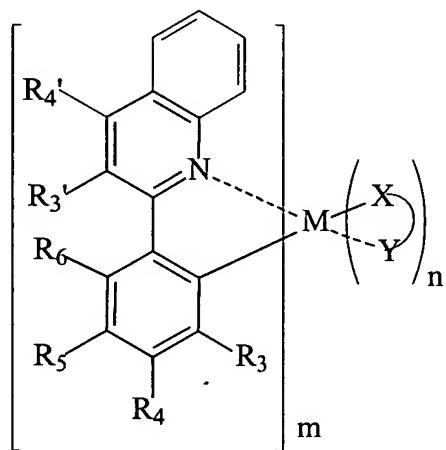
wherein

$R_4'$ ,  $R_5'$ , and  $R_6'$  are each independently H, alkyl, alkenyl, alkynyl, heteroalkyl, alkenyl, alkynyl, heteroalkyl, aryl, heteroaryl, aralkyl; and wherein  $R_4'$ ,  $R_5'$ , and  $R_6'$  are optionally substituted by one or more substituents Z; and

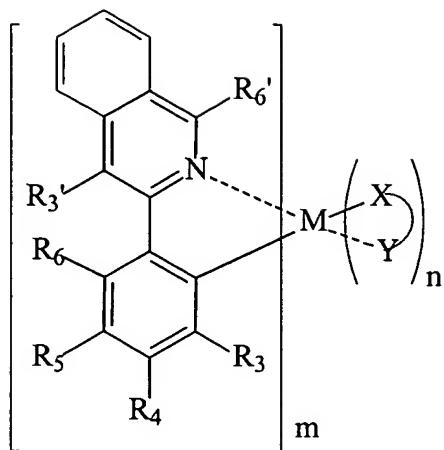
additionally or alternatively, any one or more of  $R_4'$  and  $R_5'$ , or  $R_5'$  and  $R_6'$ , or  $R_3$  and  $R_4$ , together form independently a fused 4- to 7-member cyclic group, wherein said cyclic group is cycloalkyl, cycloheteroalkyl, aryl, or heteroaryl; and wherein said cyclic group is optionally substituted by one or more substituent Z;

additionally or alternatively,  $R_3'$  and  $R_6$  are linked by a group having the formula:  $-CR_2-$ ,  $CR_2-$ ,  $-CR=CR-$ ,  $-CR_2-$ ,  $-O-$ ,  $-NR-$ ,  $-O-CR_2-$ ,  $-NR-CR_2-$ ,  $-N=CR-$  wherein R is selected from the group consisting of H, alkyl, aryl, and aralkyl.

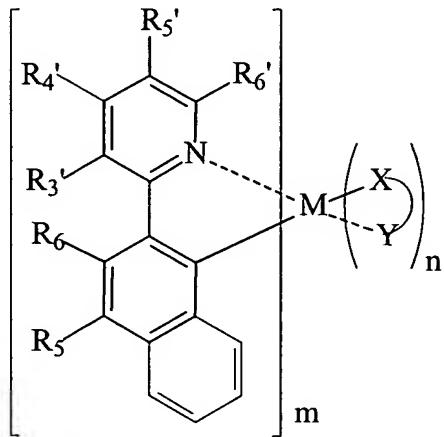
3. The compound of claim 2, having the structure:



4. The compound of claim 2, having the structure:



5. The compound of claim 2, having the structure:

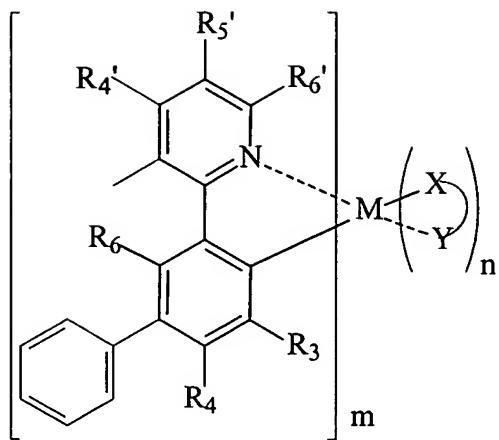


6. The compound of claim 2, wherein R<sub>5</sub> is substituted or unsubstituted phenyl, naphthyl or pyridyl.

7. The compound of claim 6, wherein R<sub>5</sub> is a phenyl.

8. The compound of claim 6, wherein R<sub>3</sub>' is a methyl group.

9. The compound of claim 2, having the structure:

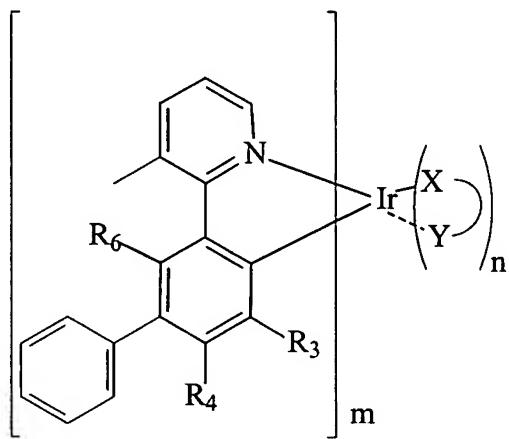


wherein  $R_5'$  and  $R_6'$  are H, and additionally or alternatively, together form a fused 4- to 7-member cyclic group, wherein said cyclic group is cycloalkyl, cycloheteroalkyl, aryl, or heteroaryl.

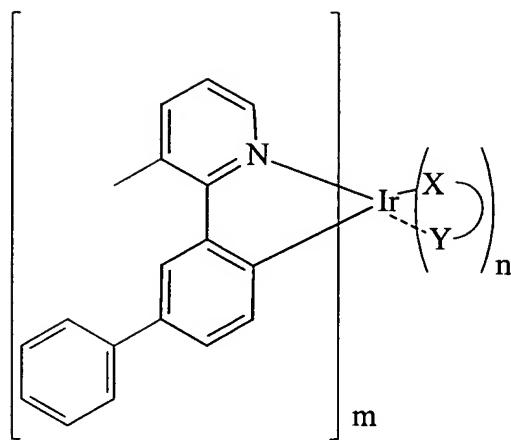
10. The compound of claim 9, wherein M is selected from the group consisting of Ir, Pt, Pd, Rh, Re, Ru, Os, Tl, Pb, Bi, In, Sn, Sb, Te, Au, and Ag.

11. The compound of claim 10, wherein M is Ir.

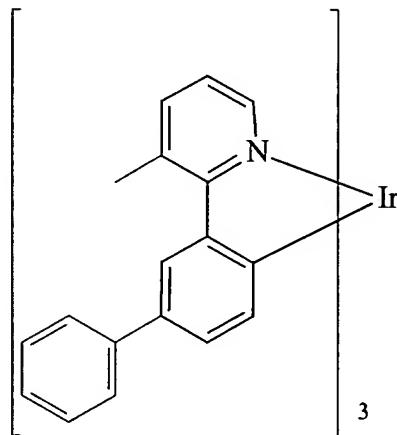
12. The compound of claim 11, having the structure:



13. The compound of claim 12, having the structure:

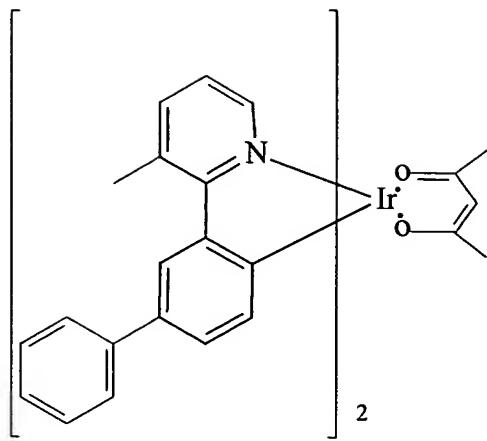


14. The compound of claim 13, wherein  $m$  is 3 and  $n$  is zero, such that the compound has the structure:

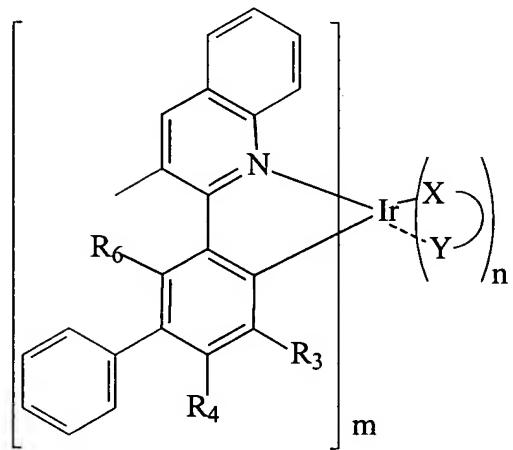


15. The compound of claim 13, wherein  $m$  is 2 and  $n$  is 1.

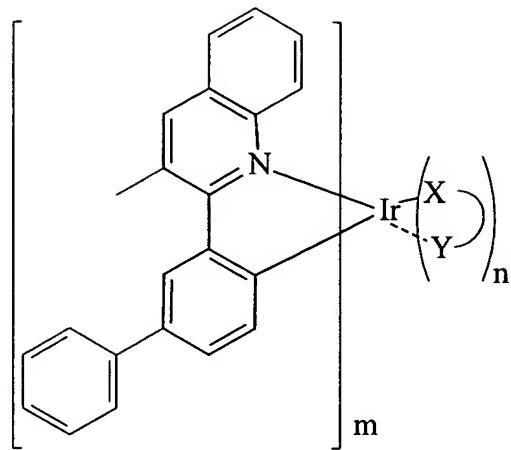
16. The compound of claim 15, having the structure:



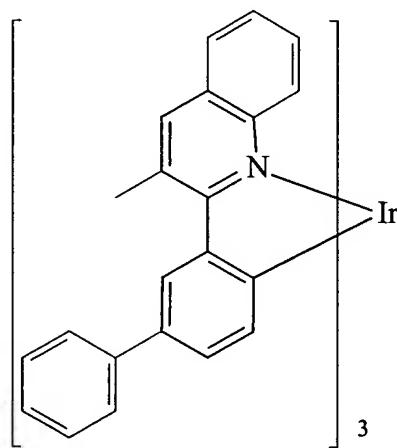
17. The compound of claim 11, having the structure:



18. The compound of claim 17, having the structure:

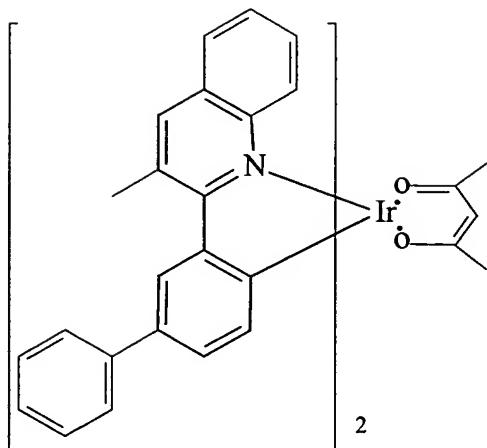


19. The compound of claim 18, wherein *m* is 3 and *n* is zero, such that the compound has the structure:

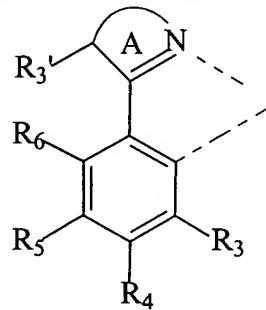


20. The compound of claim 18, wherein *m* is 2 and *n* is 1.

21. The compound of claim 20, having the structure:



22. A compound comprising a ligand having the structure:



wherein

M is a metal having an atomic weight greater than 40;

$R_3'$  is a substituent selected from the group consisting of alkyl, heteroalkyl, aryl, heteroaryl, and aralkyl, wherein  $R_3'$  is optionally substituted by one or more substituents  $Z$ ;

$R_5$  is a substituent selected from the group consisting of aryl and heteroaryl, wherein said aryl or heteroaryl is unsubstituted or optionally, substituted with one or more non-aromatic groups;

ring A is an aromatic heterocyclic or a fused aromatic heterocyclic ring with at least one nitrogen atom that is coordinated to the metal M, wherein the ring A can be optionally substituted with one or more substituents Z;

$R_3$  is a substituent selected from the group consisting of H, alkyl, alkenyl, alkynyl, alkylaryl, CN,  $CF_3$ ,  $C_nF_{2n+1}$ , trifluorovinyl,  $CO_2R$ ,  $C(O)R$ ,  $NR_2$ ,  $NO_2$ , OR, halo, aryl, heteroaryl, substituted aryl, substituted heteroaryl or a heterocyclic group;

$R_4$  is a substituent selected from the group consisting of H, alkyl, alkenyl, alkynyl, alkylaryl, CN,  $CF_3$ ,  $C_nF_{2n+1}$ , trifluorovinyl,  $CO_2R$ ,  $C(O)R$ ,  $NR_2$ ,  $NO_2$ , OR, halo, aryl, heteroaryl, substituted aryl, substituted heteroaryl or a heterocyclic group;

additionally or alternatively,  $R_3$  and  $R_4$ , together from independently a fused 4 to 7-member cyclic group, wherein said cyclic group is cycloalkyl, cycloheteroalkyl, aryl, or heteroaryl; and wherein said cyclic group is optionally substituted by one or more substituents  $Z$ ;

$R_6$  is a substituent selected from the group consisting of H, alkyl, alkenyl, alkynyl, alkylaryl, CN,  $CF_3$ ,  $C_nF_{2n+1}$ , trifluorovinyl,  $CO_2R$ ,  $C(O)R$ ,  $NR_2$ ,  $NO_2$ , OR, halo, aryl, heteroaryl, substituted aryl, substituted heteroaryl or a heterocyclic group;

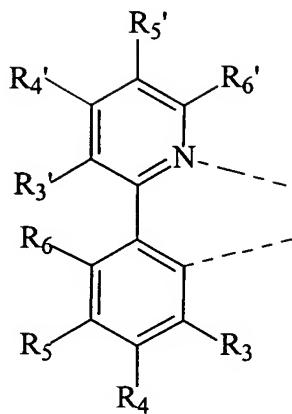
alternatively,  $R_3'$  and  $R_6$  may be bridged by a group selected from  $-CR_2-CR_2-$ ,  $-CR=CR-$ ,  $-CR_2-$ ,  $-O-$ ,  $-NR-$ ,  $-O-CR_2-$ ,  $-NR-CR_2-$ , and  $-N=CR-$ ;

each  $R$  is independently H, alkyl, alkenyl, alkynyl, heteroalkyl, aryl, heteroaryl, or aralkyl; wherein  $R$  is optionally substituted by one or more substituents  $Z$ ;

each  $Z$  is independently a halogen,  $R'$ ,  $O-R'$ ,  $N(R')_2$ ,  $SR'$ ,  $C(O)R'$ ,  $C(O)OR'$ ,  $C(O)N(R')_2$ , CN,  $NO_2$ ,  $SO_2$ ,  $SOR'$ ,  $SO_2R'$ , or  $SO_3R'$ ;

each  $R'$  is independently H, alkyl, perhaloalkyl, alkenyl, alkynyl, heteroalkyl, aryl, or heteroaryl.

23. The compound of claim 22, wherein the ligand has the structure



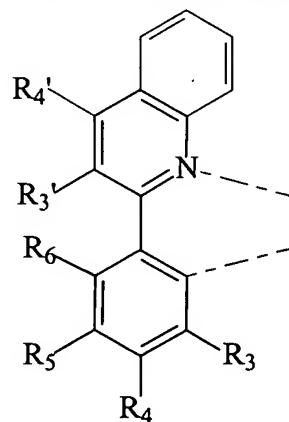
wherein

$R_4'$ ,  $R_5'$ , and  $R_6'$  are each independently H, alkyl, alkenyl, alkynyl, heteroalkyl, alkenyl, alkynyl, heteroalkyl, aryl, heteroaryl, aralkyl; and wherein  $R_4'$ ,  $R_5'$ , and  $R_6'$  are optionally substituted by one or more substituents Z; and

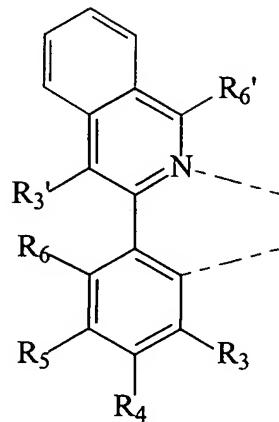
additionally or alternatively, any one or more of  $R_4'$  and  $R_5'$ , or  $R_5'$  and  $R_6'$ , or  $R_3$  and  $R_4$ , together form independently a fused 4- to 7-member cyclic group, wherein said cyclic group is cycloalkyl, cycloheteroalkyl, aryl, or heteroaryl; and wherein said cyclic group is optionally substituted by one or more substituent Z;

additionally or alternatively,  $R_3'$  and  $R_6$  are linked by a group having the formula:  $-CR_2-$ ,  $CR_2-$ ,  $-CR = CR-$ ,  $-CR_2-$ ,  $-O-$ ,  $-NR-$ ,  $-O-CR_2-$ ,  $-NR-CR_2-$ ,  $-N = CR-$  wherein R is selected from the group consisting of H, alkyl, aryl, and aralkyl.

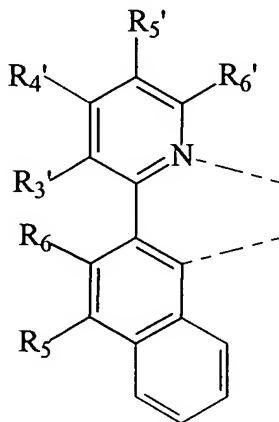
24. The compound of claim 23, wherein the ligand has the structure:



25. The compound of claim 23, wherein the ligand has the structure:



26. The compound of claim 23, wherein the ligand has the structure:

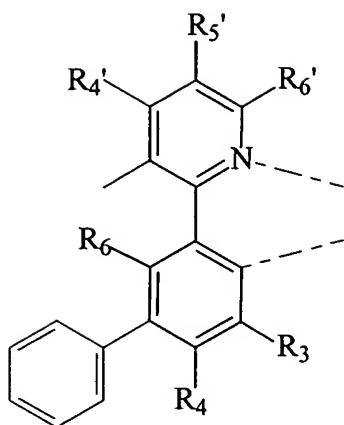


27. The compound of claim 23, wherein R<sub>5</sub> is substituted or unsubstituted phenyl, naphthyl or pyridyl.

28. The compound of claim 27, wherein R<sub>5</sub> is a phenyl.

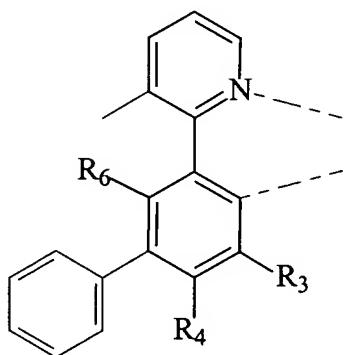
29. The compound of claim 27, wherein R<sub>3</sub>' is a methyl group.

30. The compound of claim 23, wherein the ligand has the structure:

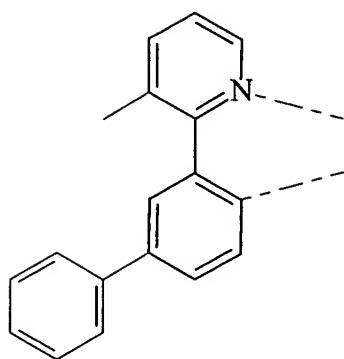


wherein R<sub>5</sub>' and R<sub>6</sub>' are H, and additionally or alternatively, together form a fused 4- to 7-member cyclic group, wherein said cyclic group is cycloalkyl, cycloheteroalkyl, aryl, or heteroaryl.

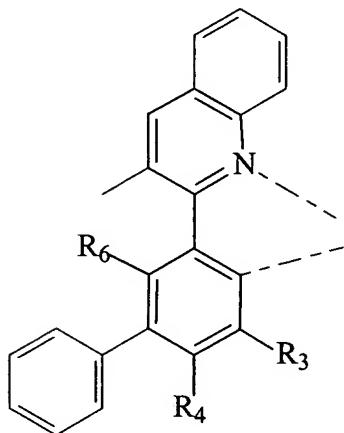
31. The compound of claim 30, wherein the ligand has the structure:



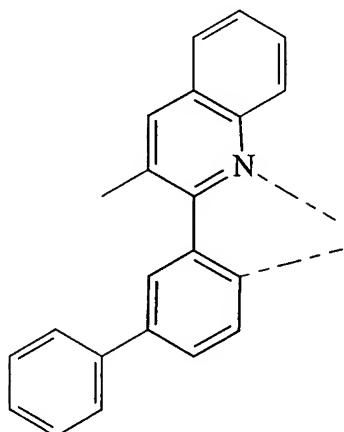
32. The compound of claim 31, wherein the ligand has the structure:



33. The compound of claim 30, wherein the ligand has the structure:

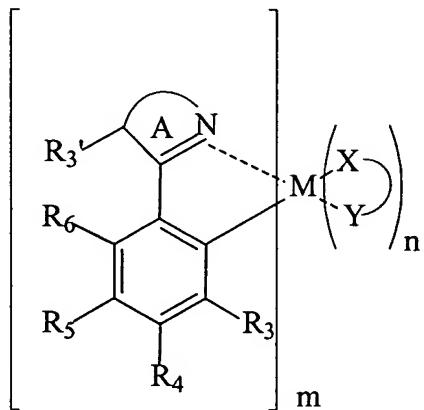


34. The compound of claim 33, wherein the ligand has the structure:



35. An organic light emitting device, comprising:

- (a) an anode;
- (b) a cathode; and
- (c) an emissive layer disposed between the anode and the cathode, the emissive layer further comprising an emissive material having the structure:



wherein

M is a metal having an atomic weight greater than 40;

$R_3'$  is a substituent selected from the group consisting of alkyl, heteroalkyl, aryl, heteroaryl, and aralkyl, wherein  $R_3'$  is optionally substituted by one or more substituents Z;

$R_5$  is a substituent selected from the group consisting of aryl and heteroaryl, wherein said aryl or heteroaryl is unsubstituted or optionally, substituted with one or more non-aromatic groups;

ring A is an aromatic heterocyclic or a fused aromatic heterocyclic ring with at least one nitrogen atom that is coordinated to the metal M, wherein the ring A can be optionally substituted with one or more non-aromatic groups;

$R_3$  is a substituent selected from the group consisting of H, alkyl, alkenyl, alkynyl, alkylaryl, CN,  $CF_3$ ,  $C_nF_{2n+1}$ , trifluorovinyl,  $CO_2R$ ,  $C(O)R$ ,  $NR_2$ ,  $NO_2$ , OR, halo, aryl, heteroaryl, substituted aryl, substituted heteroaryl or a heterocyclic group;

$R_4$  is a substituent selected from the group consisting of H, alkyl, alkenyl, alkynyl, alkylaryl, CN,  $CF_3$ ,  $C_nF_{2n+1}$ , trifluorovinyl,  $CO_2R$ ,  $C(O)R$ ,  $NR_2$ ,  $NO_2$ , OR, halo, aryl, heteroaryl, substituted aryl, substituted heteroaryl or a heterocyclic group;

additionally or alternatively,  $R_3$  and  $R_4$ , together from independently a fused 4 to 7-member cyclic group, wherein said cyclic group is cycloalkyl, cycloheteroalkyl, aryl, or heteroaryl; and wherein said cyclic group is optionally substituted by one or more substituents Z;

$R_6$  is a substituent selected from the group consisting of H, alkyl, alkenyl, alkynyl, alkylaryl, CN,  $CF_3$ ,  $C_nF_{2n+1}$ , trifluorovinyl,  $CO_2R$ ,  $C(O)R$ ,  $NR_2$ ,  $NO_2$ , OR, halo, aryl, heteroaryl, substituted aryl, substituted heteroaryl or a heterocyclic group;

alternatively,  $R_3'$  and  $R_6$  may be bridged by a group selected from  $-CR_2-CR_2-$ ,  $-CR=CR-$ ,  $-CR_2-$ ,  $-O-$ ,  $-NR-$ ,  $-O-CR_2-$ ,  $-NR-CR_2-$ , and  $-N=CR-$ ;

each R is independently H, alkyl, alkenyl, alkynyl, heteroalkyl, aryl, heteroaryl, or aralkyl; wherein R is optionally substituted by one or more substituents Z;

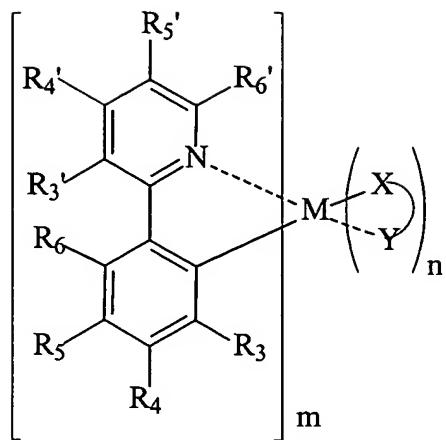
each Z is independently a halogen,  $R'$ ,  $O-R'$ ,  $N(R')_2$ ,  $SR'$ ,  $C(O)R'$ ,  $C(O)OR'$ ,  $C(O)N(R')_2$ , CN,  $NO_2$ ,  $SO_2$ ,  $SOR'$ ,  $SO_2R'$ , or  $SO_3R'$ ;

Each  $R'$  is independently H, alkyl, perhaloalkyl, alkenyl, alkynyl, heteroalkyl, aryl, or heteroaryl;

(X-Y) is an ancillary ligand;

m is a value from 1 to the maximum number of ligands that may be attached to the metal; and m + n is the maximum number of ligands that may be attached to the metal.

36. The device of claim 35, wherein the compound has the structure:



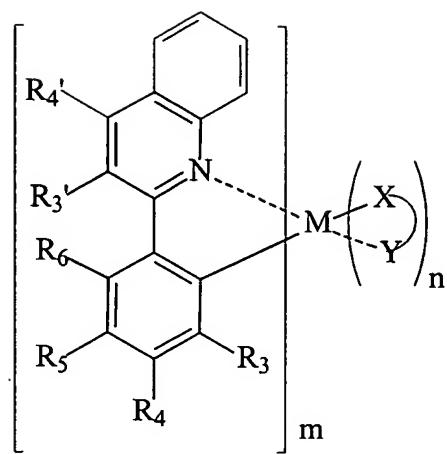
wherein

$R_4'$ ,  $R_5'$ , and  $R_6'$  are each independently H, alkyl, alkenyl, alkynyl, heteroalkyl, alkenyl, alkynyl, heteroalkyl, aryl, heteroaryl, aralkyl; and wherein  $R_4'$ ,  $R_5'$ , and  $R_6'$  are optionally substituted by one or more substituents Z; and

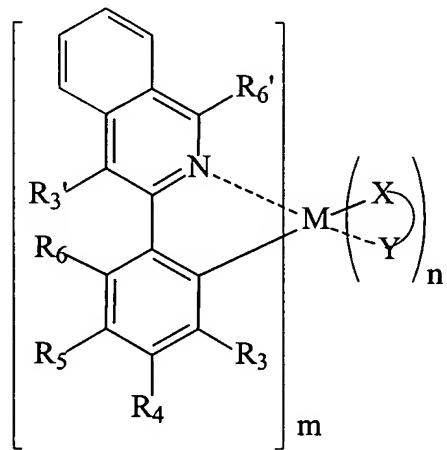
additionally or alternatively, any one or more of  $R_4'$  and  $R_5'$ , or  $R_5'$  and  $R_6'$ , or  $R_3$  and  $R_4$ , together form independently a fused 4- to 7-member cyclic group, wherein said cyclic group is cycloalkyl, cycloheteroalkyl, aryl, or heteroaryl; and wherein said cyclic group is optionally substituted by one or more substituent Z;

additionally or alternatively,  $R_3'$  and  $R_6$  are linked by a group having the formula:  $-CR_2-$ ,  $CR_2-$ ,  $-CR = CR-$ ,  $-CR_2-$ ,  $-O-$ ,  $-NR-$ ,  $-O-CR_2-$ ,  $-NR-CR_2-$ ,  $-N = CR-$  wherein R is selected from the group consisting of H, alkyl, aryl, and aralkyl.

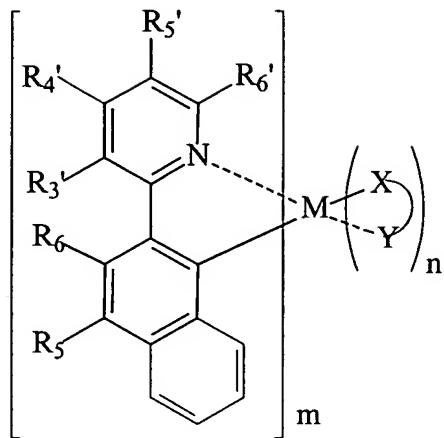
37. The device of claim 36, wherein the compound has the structure:



38. The device of claim 36, wherein the compound has the structure:



39. The device material of claim 36, wherein the compound has the structure:

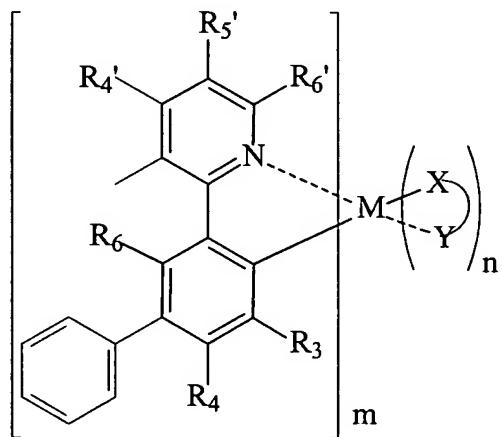


40. The device of claim 36, wherein  $R_5$  is substituted or unsubstituted phenyl, naphthyl or pyridyl.

41. The device of claim 40, wherein  $R_5$  is a phenyl.

42. The device of claim 40, wherein  $R'_3$  is a methyl group.

43. The device of claim 36, wherein the compound has the structure:

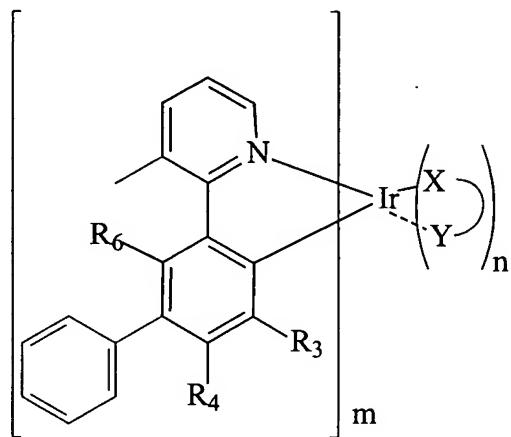


wherein  $R_5'$  and  $R_6'$  are H, and additionally or alternatively, together form a fused 4- to 7-member cyclic group, wherein said cyclic group is cycloalkyl, cycloheteroalkyl, aryl, or heteroaryl.

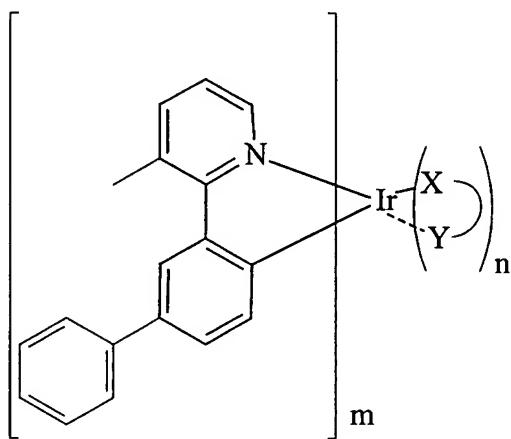
44. The device of claim 43, wherein M is selected from the group consisting of Ir, Pt, Pd, Rh, Re, Ru, Os, Tl, Pb, Bi, In, Sn, Sb, Te, Au, and Ag.

45. The device of claim 44, wherein M is Ir.

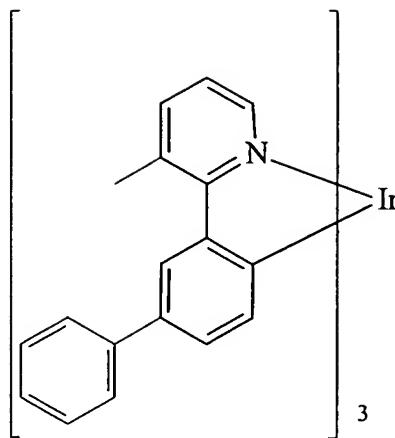
46. The device of claim 45, wherein the compound has the structure:



47. The device of claim 46, wherein the compound has the structure:

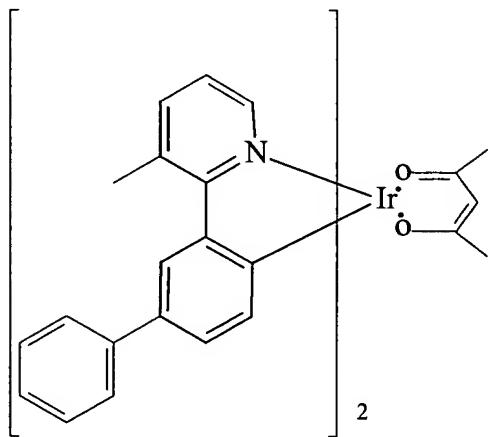


48. The device of claim 47, wherein m is 3 and n is zero, such that the compound has the structure:

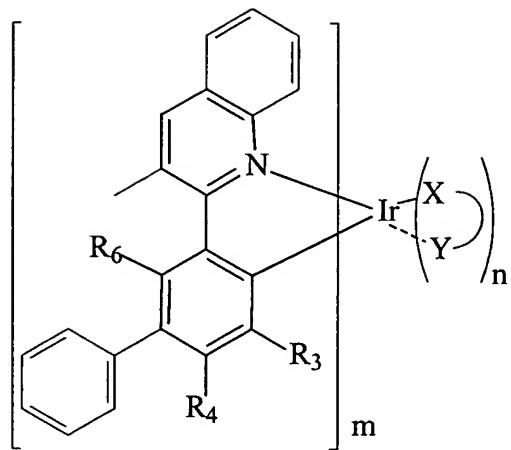


49. The device of claim 47, wherein m is 2 and n is 1.

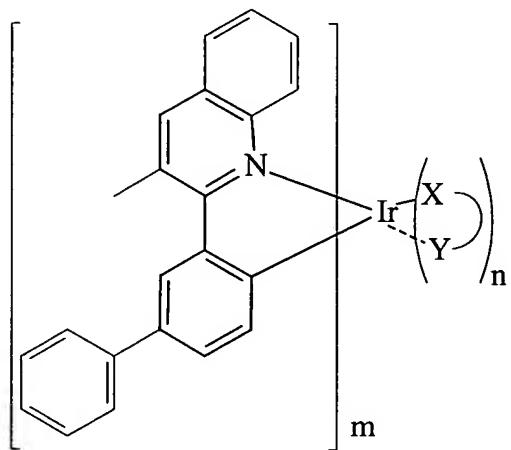
50. The device of claim 49, having the structure:



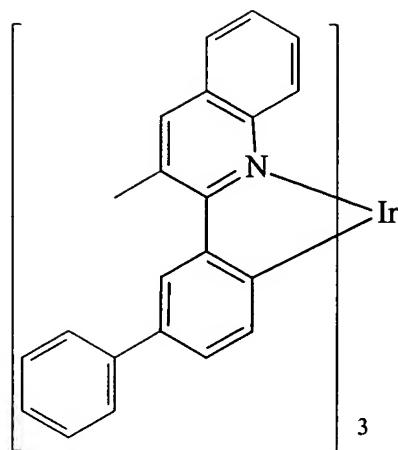
51. The device of claim 45, having the structure:



52. The device of claim 51, wherein the compound has the structure:

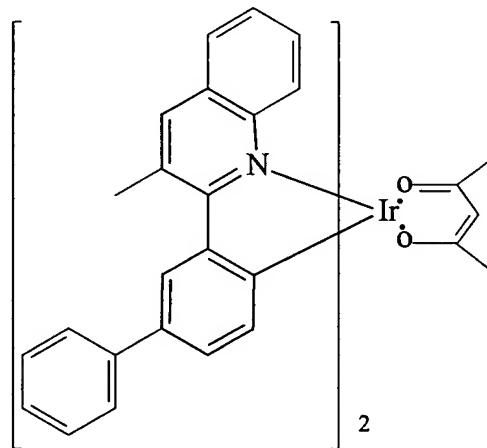


53. The device of claim 52, wherein  $m$  is 3 and  $n$  is zero, such that the compound has the structure:



54. The device of claim 52, wherein m is 2 and n is 1.

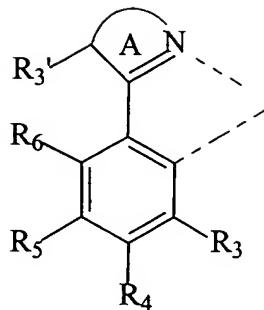
55. The device of claim 54, having the structure:



56. The device of claim 35, wherein the device is incorporated into a consumer product.

57. An organic light emitting device, comprising:

- (d) an anode;
- (e) a cathode; and
- (f) an emissive layer disposed between the anode and the cathode, the emissive layer further comprising an emissive material having a ligand with the structure:



wherein

M is a metal having an atomic weight greater than 40;

R<sub>3</sub>' is a substituent selected from the group consisting of alkyl, heteroalkyl, aryl, heteroaryl, and aralkyl, wherein R<sub>3</sub>' is optionally substituted by one or more substituents Z;

R<sub>5</sub> is a substituent selected from the group consisting of aryl and heteroaryl, wherein said aryl or heteroaryl is unsubstituted or optionally, substituted with one or more non-aromatic groups;

ring A is an aromatic heterocyclic or a fused aromatic heterocyclic ring with at least one nitrogen atom that is coordinated to the metal M, wherein the ring A can be optionally substituted with one or more substituents Z;

R<sub>3</sub> is a substituent selected from the group consisting of H, alkyl, alkenyl, alkynyl, alkylaryl, CN, CF<sub>3</sub>, C<sub>n</sub>F<sub>2n+1</sub>, trifluorovinyl, CO<sub>2</sub>R, C(O)R, NR<sub>2</sub>, NO<sub>2</sub>, OR, halo, aryl, heteroaryl, substituted aryl, substituted heteroaryl or a heterocyclic group;

R<sub>4</sub> is a substituent selected from the group consisting of H, alkyl, alkenyl, alkynyl, alkylaryl, CN, CF<sub>3</sub>, C<sub>n</sub>F<sub>2n+1</sub>, trifluorovinyl, CO<sub>2</sub>R, C(O)R, NR<sub>2</sub>, NO<sub>2</sub>, OR, halo, aryl, heteroaryl, substituted aryl, substituted heteroaryl or a heterocyclic group;

additionally or alternatively, R<sub>3</sub> and R<sub>4</sub>, together from independently a fused 4 to 7-member cyclic group, wherein said cyclic group is cycloalkyl, cycloheteroalkyl, aryl, or heteroaryl; and wherein said cyclic group is optionally substituted by one or more substituents Z;

$R_6$  is a substituent selected from the group consisting of H, alkyl, alkenyl, alkynyl, alkylaryl, CN,  $CF_3$ ,  $C_nF_{2n+1}$ , trifluorovinyl,  $CO_2R$ ,  $C(O)R$ ,  $NR_2$ ,  $NO_2$ , OR, halo, aryl, heteroaryl, substituted aryl, substituted heteroaryl or a heterocyclic group;

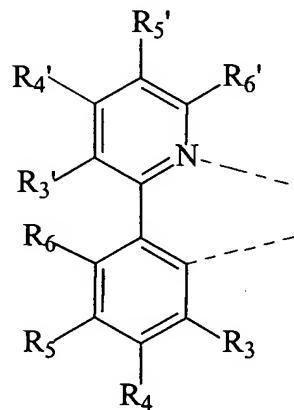
alternatively,  $R_3'$  and  $R_6$  may be bridged by a group selected from  $-CR_2-CR_2-$ ,  $-CR=CR-$ ,  $-CR_2-$ ,  $-O-$ ,  $-NR-$ ,  $-O-CR_2-$ ,  $-NR-CR_2-$ , and  $-N=CR-$ ;

each R is independently H, alkyl, alkenyl, alkynyl, heteroalkyl, aryl, heteroaryl, or aralkyl; wherein R is optionally substituted by one or more substituents Z;

each Z is independently a halogen,  $R'$ ,  $O-R'$ ,  $N(R')_2$ ,  $SR'$ ,  $C(O)R'$ ,  $C(O)OR'$ ,  $C(O)N(R')_2$ , CN,  $NO_2$ ,  $SO_2$ ,  $SOR'$ ,  $SO_2R'$ , or  $SO_3R'$ ;

each  $R'$  is independently H, alkyl, perhaloalkyl, alkenyl, alkynyl, heteroalkyl, aryl, or heteroaryl.

58. The device of claim 57, wherein the ligand has the structure



wherein

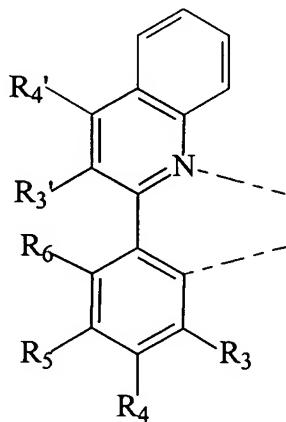
$R_4'$ ,  $R_5'$ , and  $R_6'$  are each independently H, alkyl, alkenyl, alkynyl, heteroalkyl, alkenyl, alkynyl, heteroalkyl, aryl, heteroaryl, aralkyl; and wherein  $R_4'$ ,  $R_5'$ , and  $R_6'$  are optionally substituted by one or more substituents Z; and

additionally or alternatively, any one or more of  $R_4'$  and  $R_5'$ , or  $R_5'$  and  $R_6'$ , or  $R_3$  and  $R_4$ , together form independently a fused 4- to 7-member cyclic group, wherein said cyclic group is

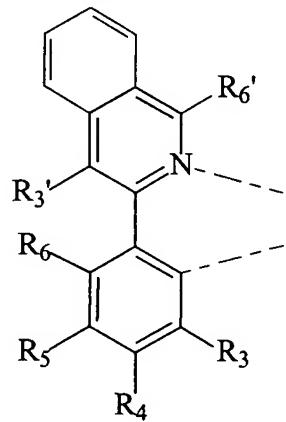
cycloalkyl, cycloheteroalkyl, aryl, or heteroaryl; and wherein said cyclic group is optionally substituted by one or more substituent Z;

additionally or alternatively, R<sub>3</sub>' and R<sub>6</sub> are linked by a group having the formula: -CR<sub>2</sub>-CR<sub>2</sub>- , -CR = CR- , -CR<sub>2</sub>- , -O- , -NR- , -O-CR<sub>2</sub>- , -NR-CR<sub>2</sub>- , -N = CR- wherein R is selected from the group consisting of H, alkyl, aryl, and aralkyl.

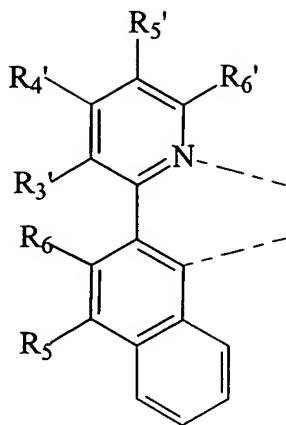
59. The device of claim 58, wherein the ligand has the structure:



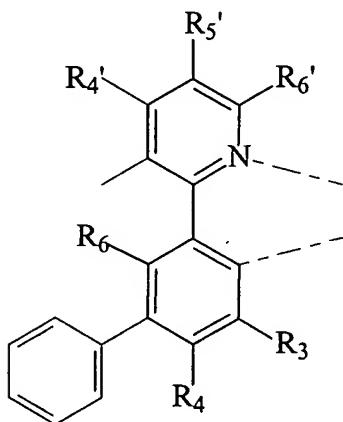
60. The device of claim 58, wherein the ligand has the structure:



61. The device of claim 58, wherein the ligand has the structure:

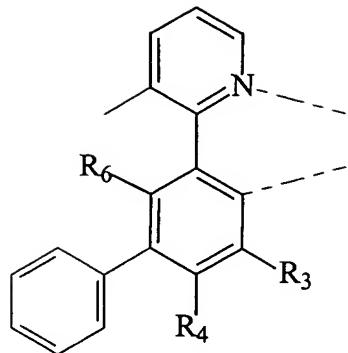


62. The device of claim 58, wherein  $R_5$  is substituted or unsubstituted phenyl, naphthyl or pyridyl.
63. The device of claim 62, wherein  $R_5$  is a phenyl.
64. The device of claim 62, wherein  $R_3'$  is a methyl group.
65. The device of claim 58, wherein the ligand has the structure:

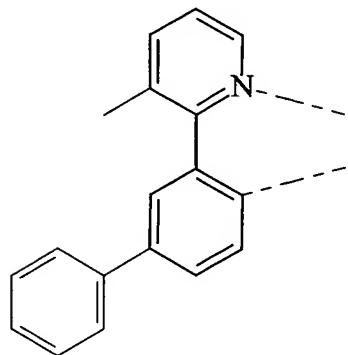


wherein  $R_5'$  and  $R_6'$  are H, and additionally or alternatively, together form a fused 4- to 7-member cyclic group, wherein said cyclic group is cycloalkyl, cycloheteroalkyl, aryl, or heteroaryl.

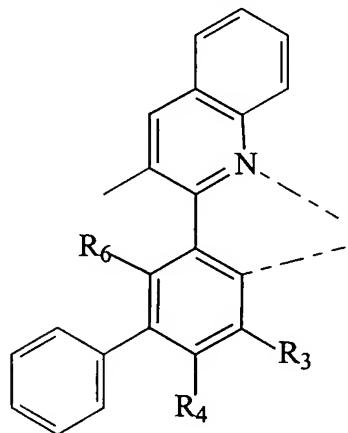
66. The device of claim 65, wherein the ligand has the structure:



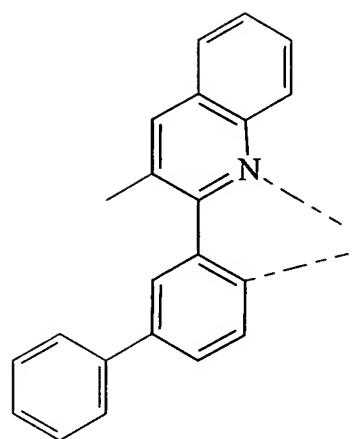
67. The device of claim 66, wherein the ligand has the structure:



68. The device of claim 65, wherein the ligand has the structure:



69. The device of claim 68, wherein the ligand has the structure:



70. The device of claim 57, wherein the device is incorporated into a consumer product.